

Application of Incident Management Systems to Public Health Events: Toronto's Experience

Presentation to
2008 Great Lakes Border Health Initiative Conference

July 10, 2008
Ann Arbor, Michigan

Marjolyn Pritchard, CPHI(C), BAA, MHSc
Program Manager,
Control of Infectious Diseases/Infection Control
Toronto Public Health

Application of IMS – Toronto's Experience

- Overview of City of Toronto
- Overview of Public Health System
- Introduction of IMS to Toronto Public Health
- Examples of incidents where IMS was used
- Learnings
- Future plans



Size of Toronto

- **Toronto is Canada's largest city, fifth largest in North America**
- **Population of about 2.6 million (with an additional 400,000 daily – work, school and entertainment)**

Diversity in Toronto

- One of the most ethno-racially diverse cities in the world
- Toronto receives 25% of all new immigrants & refugees to Canada
- Almost 50% of Toronto's population was born outside of Canada

Languages in Toronto

- Over 100 languages and dialects spoken.
- One in five Toronto residents have a home language other than English or French
- 47% of elementary students attending a Toronto District School Board schools have a language other than English as their first language

Homelessness in Toronto

- **Approximately 110 shelters/drop in centers for the homeless/under housed**
- **Every night Toronto's homeless shelter system receives about 3,700 people**

Health Care in Toronto

- **17 Acute Hospitals**
- **12 Chronic Care Hospitals**
- **81 Long term care facilities**
- **7,000 Physicians**

Why is this important??

Communication

- Know your population
- Establish processes that facilitate communication during an emergency.

Overview of Public Health

- In Canada, 3 levels of government
 - Federal - PHAC, CFIA – provide national/international co-ordination, expertise/consultation
 - Provincial – Ontario – Ministry of Health & Long-term Care (MOHLTC) -sets Legislation and Standards for program delivery
 - Local – Health Units –deliver public health programming to promote and protect health, and prevent disease within the population

Overview of Public Health

- Health Protection and Promotion Act (HPPA) (Ontario)
 - provincial legislation has defined 36 geographic health units within Ontario, each with a Board of Health
 - requires each Board of Health to provide public health programs and services
- Ontario Mandatory Health Programs and Services Guidelines (MHPSG)
 - minimum standards for public health programs and services

Accountability and funding

- Service funding:
 - Mandatory programs - 75% provincially funded, 25% municipally funded.
 - Some 100% provincially funded programs – eg. Healthy Babies, Healthy Children
 - Some 100% City funded – to meet local needs. Within Toronto includes Animal Services, Seniors Dental Services
- BOH accountable to Province for service delivery

Toronto Public Health (TPH)

- Canada's largest local public health agency
- 1800 staff
 - nurses, public health inspectors, physicians, dietitians, nutritionists, epidemiologists, dentists, dental hygienists, health promotion specialists, peer workers, administrative staff, animal control officers
- Annual budget \$200 million
- 30 service locations

Toronto Public Health (TPH)

Mission

Improve the health of the whole population
and reduce health inequalities

Toronto Public Health (TPH)

Strategic Directions: (2005-2009)

1. Improve the health of the city's diverse population through responsive services
2. Champion public health for Toronto
3. ***Anticipate, prevent and respond effectively to public health emergencies***
4. Work with others to create integrated health and social systems that serve Toronto's needs
5. Be an innovative and effective public health organization
6. Be the public health workplace of choice

Toronto Public Health

- Healthy Environments
- Communicable Disease Control
- Healthy Families
- Healthy Living
- Dental and Oral Health Services
- Planning and Policy
- Finance and Administration Services

Toronto Public Health

- Healthy Environments **
- Communicable Disease Control **
- Healthy Families
- Healthy Living
- Dental and Oral Health Services
- Planning and Policy (Emergency planning)
- Finance and Administration Services

TPH – Environmental Health response

Healthy Environments program includes:

- Food Safety Program –
- Health Hazards – Swimming pool/spas, WNV mosquito abatement, other health hazards (complaint response).
- Rabies Control Program –

TPH - Communicable Disease Response

Communicable Disease Control Programs include:

- Communicable Disease Surveillance Unit (CDSU)
- Tuberculosis (TB) Control Program
- Sexually Transmitted Infections (STI) Program
- Vaccine Preventable Diseases (VPD) Program
- Needle Exchange
- Sexual Health Clinics
- Control of Infectious Disease/Infection Control Program (CID/IC)*
- Communicable Disease Liaison Unit

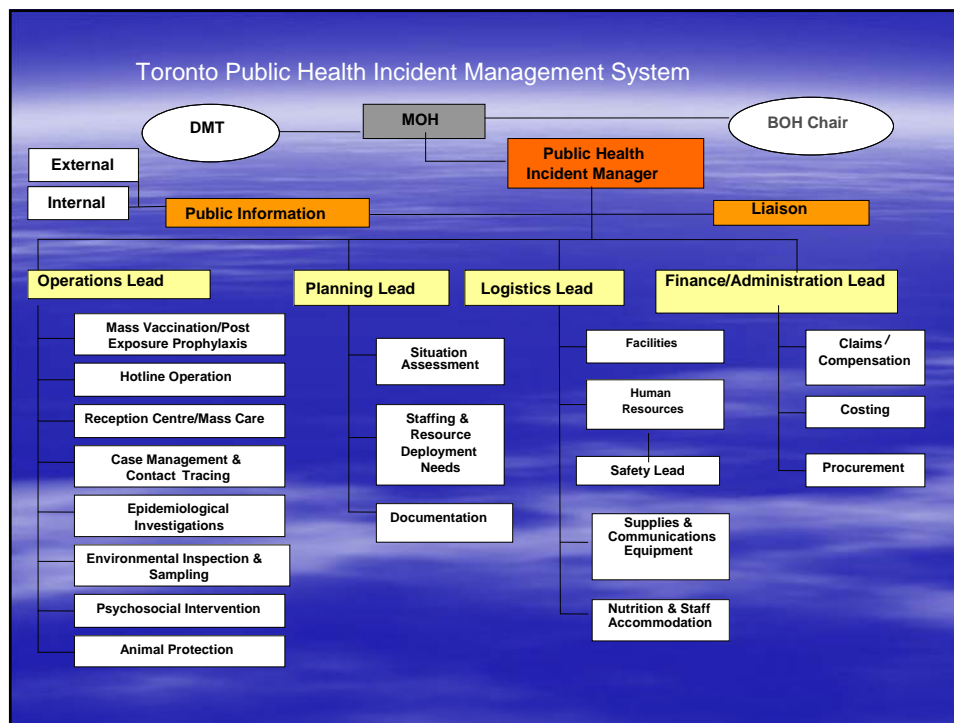
Introduction of Incident Management System (IMS) to TPH

- TPH management team - first introduction to IMS in 2002
- Benefit - enabled co-ordination with city/provincial partners during an emergency response

Introduction of Incident Management System (IMS) to TPH

2003

- Emergency Planning and Preparedness (EPP) team created a video explaining various components of IMS
- Road show – EPP staff attended all team meetings to introduce IMS to TPH staff.
- Managers received additional training to increase familiarity with the IMS structure.



Anticipated use of IMS by TPH

All types of major incidents

- **Hazardous materials incidents** (*chemical spill/fires*)
- **Natural disasters** (*snowstorm, heat wave*)
- **Terrorist events** (*anthrax scare, CBRN*)
- **Planned events** (*World Youth Day*)
- **Biological events** (*Disease Outbreaks*)
- **Technological** (*Y2K*)

Use of IMS within CDC program

- **350 outbreaks**
 - Enteric/Respiratory outbreaks in long term care homes/retirement homes/hospitals/day nurseries
 - Food poisoning outbreaks – large events
- 1-2 per year (on average) large enough to warrant IMS response

Emergency responses

- 2001 - white powder (Anthrax)
- 2002 - Hepatitis A (foodhandler), Shigella (pasta salad)

Introduction of IMS - Toronto Public Health

- 2003 – **SARS**
- 2005 – **Legionnaires**, Salmonella (bean sprouts)
- 2006 – Measles, Pertussis, Botulism (carrot juice), Hep B (Hospital Dialysis unit), Hepatitis A (cluster in ethnic community)
- 2007 – Mumps (east coast university students), VTEC (Picnic –ethnic community)
- 2008 – Rabid puppies, Measles

T.O. travel alert

**SARS RIDES
THE RAILS**

Quarantined

**'Unlinked' cases
fuel SARS worry**

**SARS: 'We have
not lost control'**

**SARS fears shut down
Toronto school**

Parents alerted
after three pupils
in kindergarten
hit by high fevers

**600 told
to stay in
as SARS
erupts**

**Commuters
into Toronto
ride out scare**

Perception has T.O. tourism feeling ill

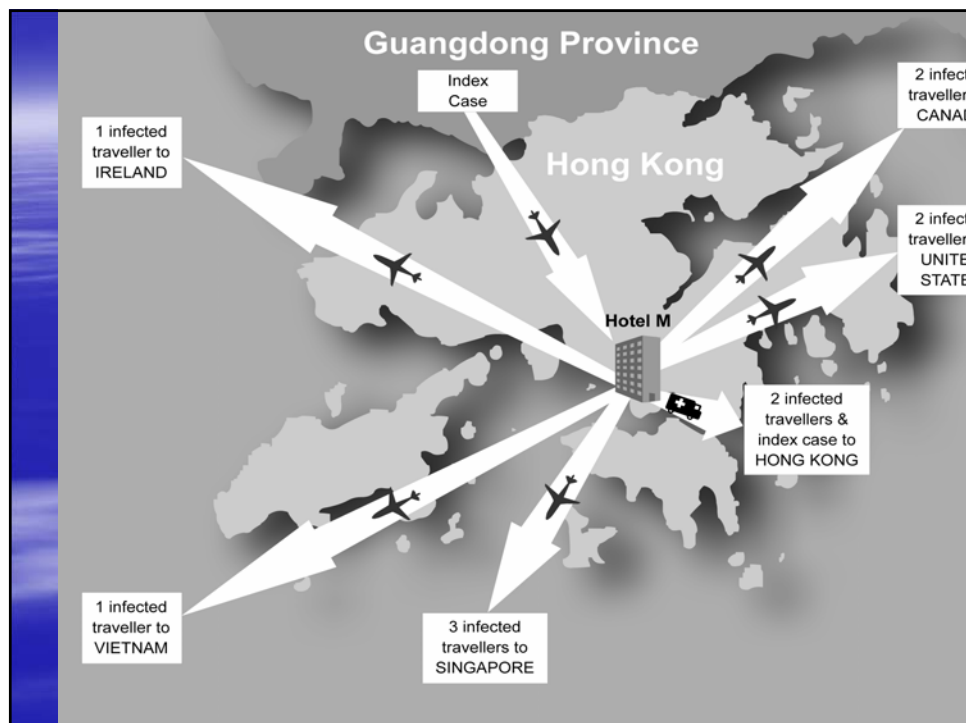


Where it began ...



Where it began. . . .

- 21 February, 2003 a Chinese Doctor from Guangdong checks into room 911 at the Metropole hotel. . . .



Sunday, February 23



Index Case
(Mother)

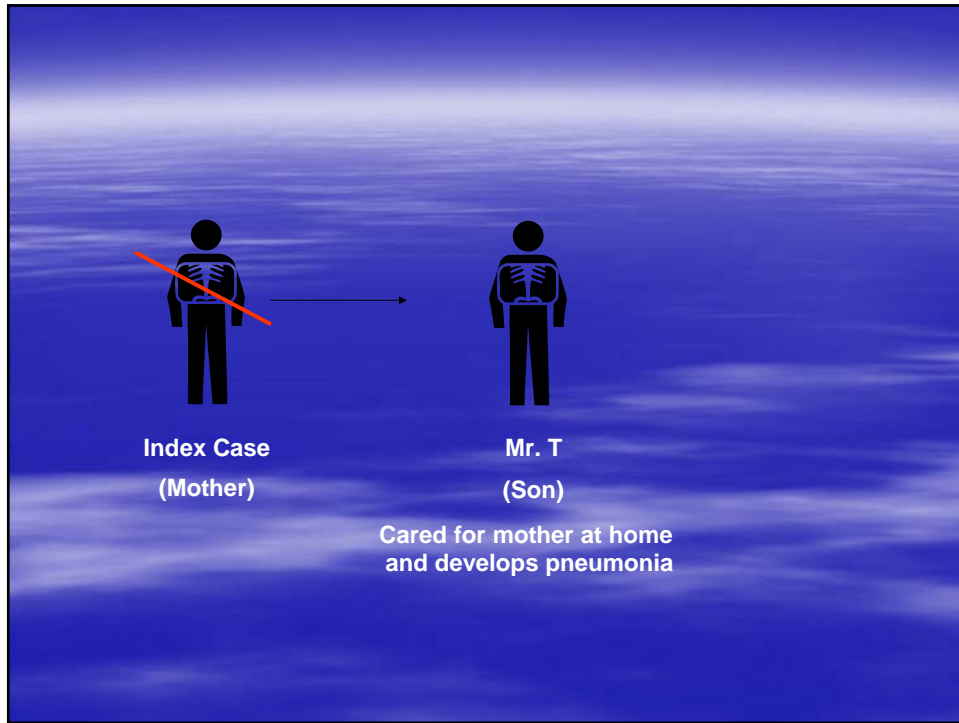
Returns to Toronto and
develops pneumonia that week

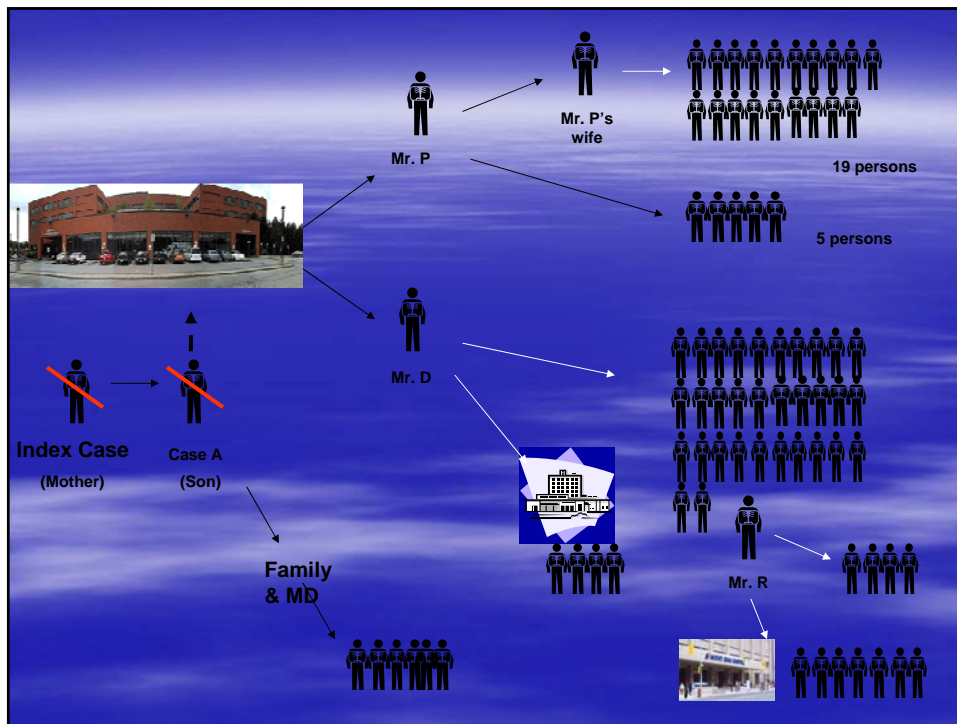
Wednesday, March 5th



Index Case
(Mother)

Dies at home





A Brief Chronology

- March 9 - Toronto's first SARS case reported as possible TB
- March 12 - WHO alert of "atypical pneumonia"
- March 13 - First case in hospital dies; 4 family members admitted with illness
- March 14 - Joint press conference

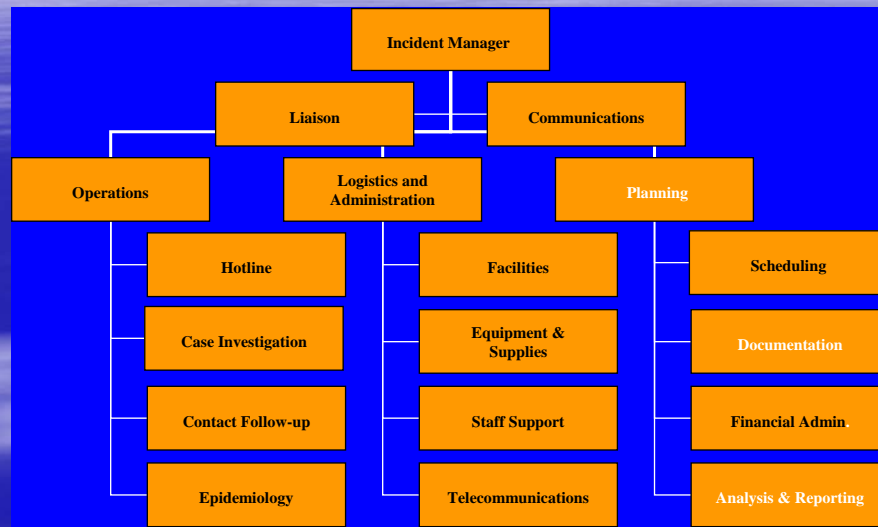
Implementation of IMS

- Press conference – public directed to call TPH with questions => HOTLINE
- Increased number of suspect cases reported, long list of contacts for each case => Expand staff in CASE/CONTACT mgmt
- Data Collection/Analysis => EPIDEMIOLOGY
- Moving all staff to one location => LOGISTICS

Implementation of IMS

- Acquisition of additional equipment (hotline connections, computers, phones, desks etc) => LOGISTICS, FINANCE
- Extended hours => FINANCE, SCHEDULING
- Media updates => COMMUNICATIONS
- Co-ordinated response to outside agencies => LIAISON

Incident Command Structure



Outbreak Control

How do you respond to an outbreak when:

- Agent is unknown
- Incubation period uncertain
- Mode of transmission not entirely clear
- No diagnostic test
- No prophylaxis
- No vaccine
- No treatment

Case/Contact Management

- **No existing procedures**
- **No standardized data collection tools**
- **No IT system for tracking cases/contacts**
- **Information changing daily (or more often)**

Planning component needed

A Brief Chronology

- **March 21 - Illness in hospital workers**
- **March 23 - Establishment of "SARS" ward**
- **March 24 - SARS designated reportable, communicable and virulent**
- **March 25 - Closing of index hospital**
- **March 26 - Provincial health emergency declared**

A Brief Chronology

- March 27 - Provincial leadership and first infection control directives to hospitals, LTCF, MD's, CHC's...; formation of "Science Committee"
- March 28 - Closing of second hospital
- April 16 - Cluster of cases in 'protected' workers

A Brief Chronology

- May 16 - Outbreak thought to be over "New Normal" directives issued
- May 23 - Unrecognized cases and spread in a new hospital
- Phase 2 limited to hospital patients, HCWs and visitors
- June 12, 2003 - Last case ill

A Brief Chronology

- Phase 1: Mar 13 - Apr 20
- Phase 2: May 20 - Jun 24

Figure 1: Toronto SARS Cases* Contacts Requiring Quarantine†

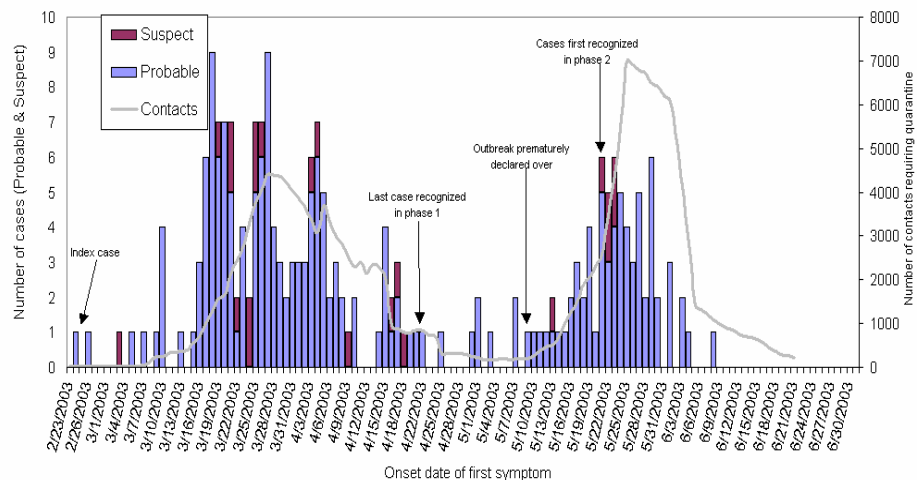
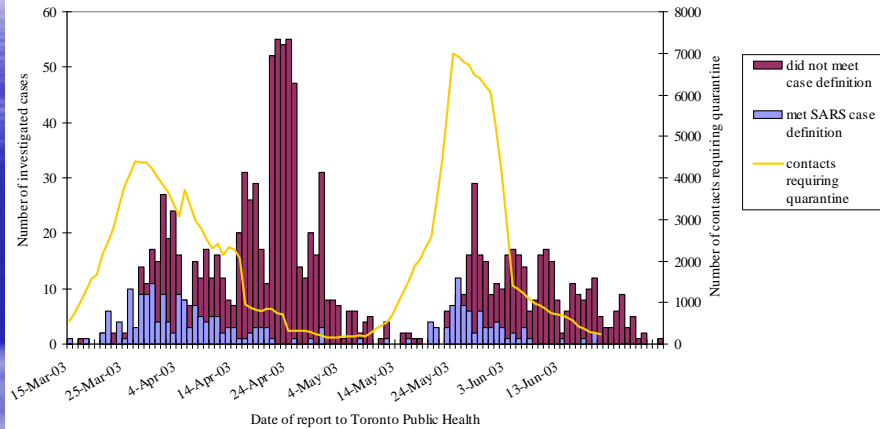


Figure 2. Cases investigated for SARS and contacts identified as requiring quarantine



Workload Volumes for Phase 1 & 2

- Over 300,000 calls to hotline March 15 - June 24, 2003; 47,567 calls on one day
- Approx. 2,000 case investigations (average 9 hrs/investigation)
- 198 Probable Cases and 26 Suspect Cases
- 23,306 contacts followed up; up to 6,995 people quarantined at any time

Staffing

- 700 staff assigned full-time
- 2 shifts per day (8 a.m.-11 p.m.), 7 days/week
- Up to 400 staff on duty each shift
- Active assistance from Province
- Many others came to help:
 - Other public health units
 - Community Medicine Specialists
 - Health Canada
 - Department of National Defense

Emergency response 2003-2004

2003 -

- Blackout in August 2003 (limited TPH participation in the CITY IMS response)
- WNV – 2nd year – specialized team

2004 –

2005 – Respiratory illness in Long term care home



Toronto's 'Mystery virus'

- Sept 27th – TPH receives a report - cluster of residents with respiratory symptoms starting Sept 24th (6 ill, 3 hospitalized)
- Pneumonia commonly reported during LTCH respiratory outbreaks
- Usual tests conducted – NP swabs taken (all results Negative)
- *Further testing initiated – Urine for legionella, NP for other M. pneumonia and C. pneumonia*
- Surveillance within the LTCF escalated Friday Sept 30th and additional cases were sent to hospital

Actions by TPH

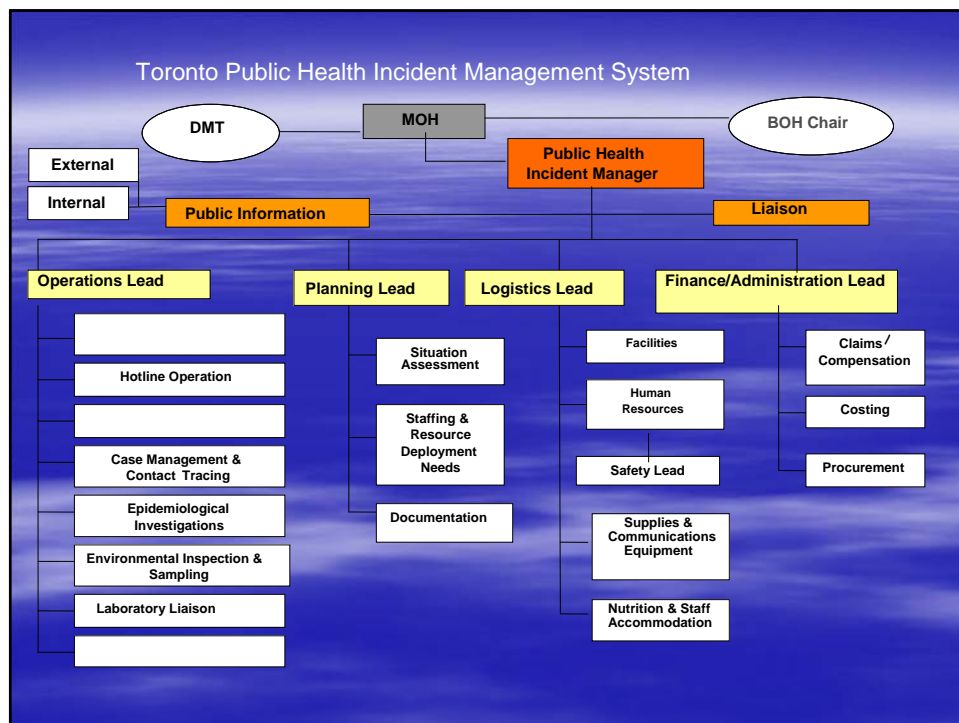
- Hospital physician called the TPH AMOH on call to express concern.
- TPH sent fax alert to all hospitals at 11:00 p.m. Sept 30th, advising of the outbreak.
- A teleconference was arranged for 10:00 a.m. October 1st, 2005.
- October 1st, 2005 68/248 residents reported with illness, 17 hospitalizations and 4 had died.



Actions by TPH (Cont'd)

Created command post, utilized Incident Management System (IMS) for emergency response

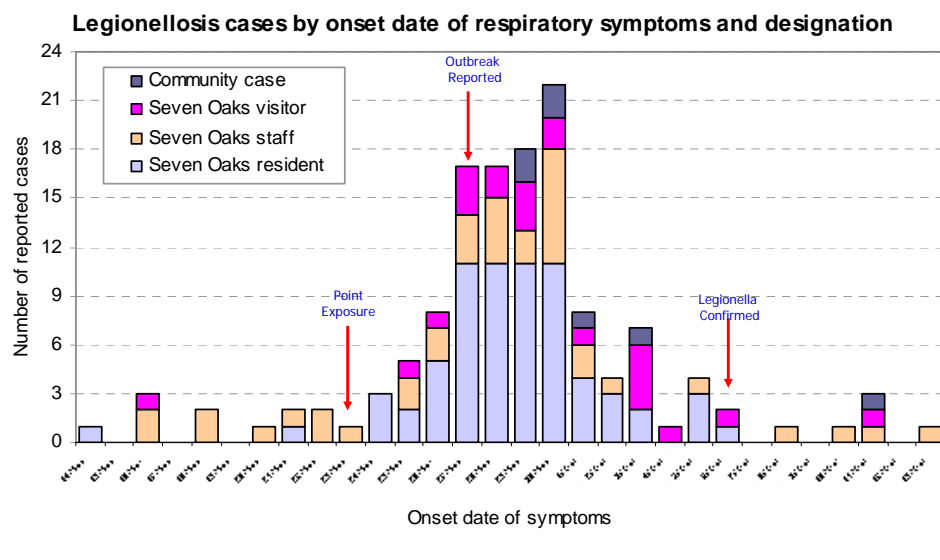
- Brought in extra staff
- Set up a hotline (to respond to calls from community)
- Increased surveillance (Created Access database)
- Conducted case and contact investigation
- Increased infection control measures
- Chaired daily teleconferences with stakeholders



Legionella identified

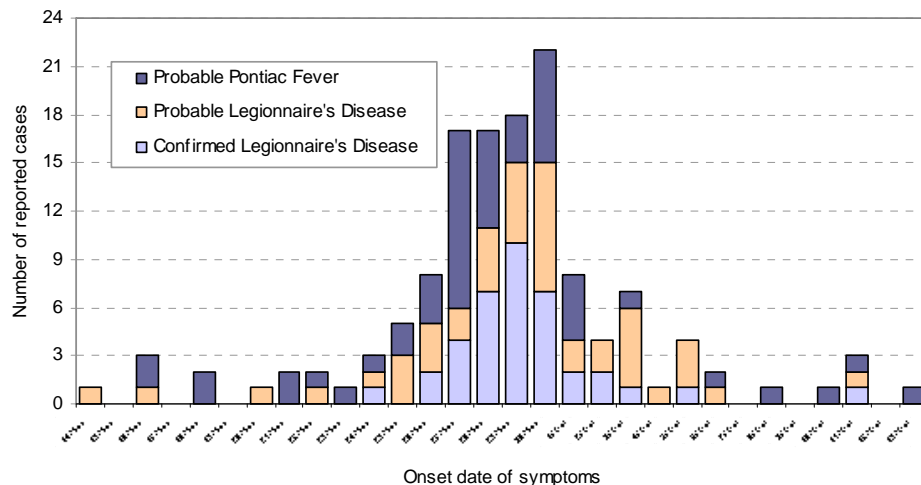
- Oct 6th – first positive confirmation of *Legionella* (culture) in lung tissue of deceased resident
- Air handling system turned off, bottled water provided and environmental sampling initiated
- Active case finding continued
- Added lab confirmation through use of Binax NOW to detect urine antigen

Epidemic Curve – all cases



Epidemic Curve - Legionellosis

Legionellosis cases by onset date of respiratory symptoms and episode status



Environmental Investigation

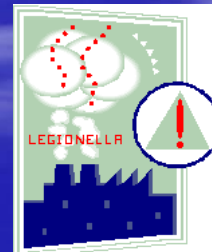
- Thurs. Oct. 6th - Health Hazard team becomes involved from environmental perspective, inspection conducted of Seven Oaks facility to determine possible sources of outbreak.
- Cooling tower had been shut down Sept. 30.
- HVAC system turned off, exhaust was operational and resident room windows opened to provide fresh air into the facility

Environmental Investigation

- Indoor air sampling conducted throughout the facility and the day care attached to the building using a handheld YES-205 Air Quality Monitor
- Total of 330 environmental samples were collected
 - shower facilities
 - 10 HVAC systems in the facility
 - cooling tower (In LTCH and Nearby buildings)

Environmental analyses

- Results of the samples
 - Several cooling towers in area had *Legionella* bacteria detected
 - Oct 21st - CPHL confirmed a match between environmental samples of *Legionella* species and clinical isolates from lung tissue (close to the Rome strain)
 - Cooling tower at Seven Oaks confirmed source



Emergency responses

- 2005 – **Legionnaires**, Salmonella (bean sprouts)
- 2006 – Measles (cluster), Pertussis, Botulism (carrot juice), Hep B (Hospital Dialysis unit), Hepatitis A
- 2007 – Hep B (LTCH), Mumps (east coast university students), VTEC (Picnic –ethnic community)
- 2008 – Rabid puppies, Measles (cluster of 150 s/p/c cases)

Assessments and recommendations

External reviews:

- Campbell Commission of Inquiry into SARS
- Naylor Committee on SARS and Public Health
- Walker Panel on Infectious Diseases
- National working group on “Strengthening Public Health Infrastructure”
- Provincial Infectious Diseases Advisory Committee
- Organizational review of Emergency Preparedness & Response capacity

Assessments and recommendations

Internal Review processes:

- Debriefing sessions held after every event.
- Debriefing sessions included internal and external stakeholders.
- Structure of the Debriefing sessions (Appreciative Learning Model):
 - Appreciates the work that has been done.
 - What worked well.
 - What do we need to do more of.
 - How to move forward.
 - (Areas in need of improvement).

Recommendations

- General
- Communications
- Logistics
- Human resources
- Information Systems
- Emergency Planning and Preparedness
- Financial
- Operations
- Evaluation

Recommendations - General

- Staff awareness of role in an emergency (using IMS model)
- Establish criteria for when to implement IMS model.
- Build more effective communications and working relationships before and during emergencies through clarification of roles and responsibilities at municipal, provincial and federal levels.
- Provincial and Federal liaison people assigned to work on site.

Recommendations - Communications

- Develop ongoing liaison with hospitals to allow for improved information exchange.
- Develop a plan for community outreach during an emergency.
- Provide staff with timely access to information for dissemination to the public.
- Improve internal communications (updates to all TPH staff regarding the event).

Recommendations - Communications

- Develop secure electronic web site accessible to staff and partners working offsite (extranet site).
- Identify (ahead of time) all internal and external stakeholders who may need to be contacted.
- Clarify protocols involving role and function of lead spokesperson during an emergency.
- Develop and provide risk communications training to lead spokespersons.
- Ensure the right people are invited to the meetings.

Recommendations - Communications

- Formulate key messages and reiterate them often
- Adapt health messages to needs of different audiences and deliver in-person where possible
- ensure information is accessible, linguistically and culturally appropriate
- Be readily available to media
- Minimize number of spokespersons
- Rigorous document control; clear processes for information management
- Ongoing relationships & partnerships are essential

Recommendations - Logistics

- Identify and secure access to space.
- Ensure capabilities to scale up a hotline within 12 hours to support the response.
- Develop hotline protocols, procedures and other supporting documentation.
- Develop a plan to access computers, fax machines photocopies etc within 24 hours.
- Ensure adequate capacity for translation and interpretation services.
- Establish agreements with other City departments for after hours support (IT, Legal etc)

Human resources Recommendations

- Each program area to identify a champion to ensure staff have skills and knowledge to use IMS model during an emergency.
- Ensure sufficient training to support surge capacity requirements
- Maintain records of staff skill sets and additional training received.
- Negotiate with bargaining agents and prepare plans for staffing.

Human resources Recommendations

- Work with Human Resources, to develop an employee assistance program support plan for addressing the complex emotional and mental health challenges that affect staff during and after an emergency.
- Establish the role of the Mental Health team to provide support to staff during an emergency.

Human resources Recommendations

- Develop a recruitment strategy for emergency response.
- Develop staff scheduling templates

Information Systems Recommendations

- Ensure availability of a flexible, robust information technology system for surveillance, case/contact management which supports data sharing between health agencies.
- Explore the development of more efficient remote access to LAN drive and e-mail for staff.

Emergency Planning & Preparedness Recommendations

- Develop an emergency response redeployment strategy.
- Prepare protocols, procedures, policies guidelines and templates.
- Ensure personnel are assigned to the planning function as early as possible.

Emergency Planning & Preparedness Recommendations

- Assess effectiveness of the incident management meetings during an emergency.
- Evaluate the protocols, guidelines templates and refine them as necessary.

Financial Recommendations

- Estimate the resources required for staff training and build these requirements into the base operating budget.

Operations Recommendations

- Adopt standardized documentation procedures to be implemented at the start of an emergency.
- Ensure sufficient number of physician are available to work directly with case/contact management teams at all times.
- Ensure an adequately resourced epi team
- Ensure adequate clerical support is deployed.

Operations Recommendations

Mass Vaccination/post exposure prophylaxis

- Ensure clear messaging to the public at the clinic, sufficient supplies, good location.

Case/Contact management

- Ensure electronic records maintained as a case/contact file is assigned/reassigned.

Operations Recommendations

Epidemiological Investigation

- Develop standardized questionnaires with clear definitions.
- Ensure IT system for data collection and analysis.

Evaluation Recommendations

- Build capacity for evaluation of activated emergency responses and response preparedness planning activities.
- Review the process and outcome of all emergency responses, modify emergency preparedness activities and disseminate findings.

Lessons aren't learned until
behaviours change.

Incorporate recommendations into the TPH response plans

Created a committee to enhance outbreak response.

Mandate – Develop OB response plan to address significant communicable disease OB/events – focus on CIDIC and CDLU program diseases. Use the TPH IMS model to guide planning.

Work of the outbreak Response committee

- Establish terms of reference
- Benchmarking
 - with other HUs/organizations regarding OB/emergency response
 - 3 Ontario HUs – London, Ottawa, Peel
 - 1 Canadian HU- Vancouver
 - 3 American PH org.– New York City, Chicago, Los Angeles
 - one non-health related emergency responder - Canadian Interagency Forest Fire Centre

Benchmarking cont'd

Questions included:

- Distinguishing between small vs large OBs
- P and Ps for ramping up for large OBs/emerg.
- Task lists for the different OB response functions. Matching skills to tasks.

Benchmarking cont'd

Questions included:

- Training for those involved in surge (for tasks outside of normal activities)
- Deciding on level of response
- Decisions re deployment of staff and continuity of service

Work of the outbreak Response committee

- Establish terms of reference
- Benchmarking
- Draft a comprehensive OB response Policy and Procedure

Revision of the IMS function checklists

- Incorporate (where appropriate) the debriefing recommendations.
- Reduce the number of the tasks.
- Incorporate sample meeting agendas with the checklists for IMS command and the function leads, to ensure inclusion of key issues.

Revision of the IMS function checklists (cont'd)

- Provide details of the linkages between the various functions/sub functions.
- Created smaller/detailed “to do” lists at the end of the checklists (to hand off to others supporting the function/sub function).

Where have lessons changed behaviour

- Province has implemented iPHIS - a new case/contact management and surveillance system - and continues to provide improvements.
- Health and Safety - Mask Fit testing of all staff.
- Internal communications improved (with a number of the more recent responses).
- Increased familiarity with IMS (through actual experience).

Where have lessons changed behaviour

- Planning function continues to be developed and used in more recent responses.
- Hotlines set up quickly, efficiently.
- Generic data collection forms and analysis programs have been developed and tested.
- Vaccination clinics set up quickly, efficiently.
- Clear criteria for implementation of IMS for Disease outbreaks.

Future Plans

- Final stages of completing the IMS Command, function & sub-function checklists.
- Assigning management staff to the IMS function/sub function leads.
- Provide additional training – using specific disease outbreaks for table top scenarios.
- Continue to use IMS for the smaller 'e' emergencies using revised checklists.

QUESTIONS?



Marjolyn Pritchard
416 -338-8352
E- mail address: pritchrd@toronto.ca